Methods: The mouse femoral artery wire injury model was performed in 10-week-old male C57BL/6 mice. Treatment groups included control, injury, and injury + NO (n = 5/group). Arteries were harvested at 24 hours, 3 days, 7 days, and 2 weeks after injury and assessed for $Sca1^+$ cells using immunofluorescence. $Sca1^+$ staining was graded on a scale of 0 to 4 for the intima, media, and adventitia in four high-power fields per section.

Results: $Sca1^+$ staining in the adventitia after injury significantly decreased at 24 hours (1.9 ± 0.13, $P = .001$) and 3 days (1.9 ± 0.12, $P = .001$) and returned to baseline by 2 weeks. $Sca1^+$ staining in the media after injury significantly increased by 7 days (2.3 ± 0.23), and persisted to 2 weeks (2.4 ± 0.19) after injury ($P = .001$). $Sca1^+$ staining in the intima after injury also significantly increased by 7 days (3.0 ± 0.14) and persisted to 2 weeks (2.7 ± 0.14) after injury ($P = .001$). In the adventitia, NO had no significant effect on $Sca1^+$ levels. However in the media, NO significantly decreased $Sca1^+$ levels at 7 days (1.5 ± 0.19) vs injury alone ($P = .002$). In the intima, NO significantly decreased $Sca1^+$ levels at 7 days (2.2 ± 0.23) and 2 weeks (2.3 ± 0.18) vs. injury alone ($P = .001$ and $P = .03$, respectively).

Conclusions: The level of resident Sca1+ stem cells decreases in the adventitia after arterial injury and then increases in the media and neointima, suggesting that $Sca1^+$ stem cells contribute to the formation of neointimal hyperplasia. NO decreases $Sca1^+$ levels in the intima and media after injury, suggesting one mechanism by which NO may inhibit the formation of neointimal hyperplasia. Together, these data suggest an important role of $Sca1^+$ stem cells in the arterial injury process. Identification of the mechanism of $Sca1^+$ inhibition by NO could lead to a therapy to prevent neointimal hyperplasia.

Patients With Chronic Obstructive Pulmonary Disease Have Shorter Survival but Superior Endovascular Outcomes After Endovascular Aneurysm Repair

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Objectives: This study was conducted to determine the effect of pulmonary disease on outcomes after endovascular abdominal (EVAR) and thoracoabdominal (eTAAA) aneurysm repair.

Methods: A prospective study of high-risk patients undergoing EVAR and eTAAA repair between 1998 and 2009 was used to contrast clinical and endovascular outcomes between chronic obstructive pulmonary disease

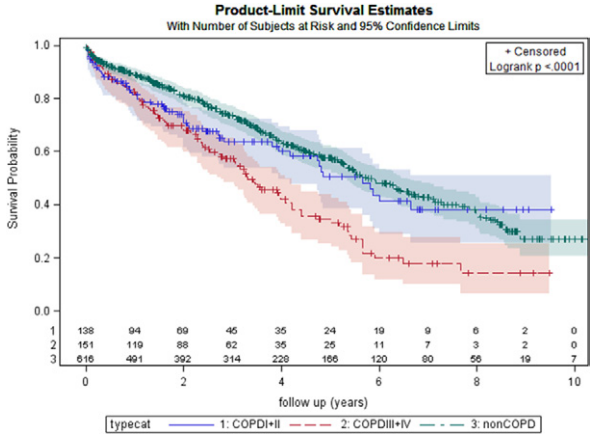

Fig.

(COPD; group 1) and non-COPD patients (group 2). COPD patients were classified in accordance with the severity of their pulmonary disease using the criteria. Survival, morphologic changes, and complications were assessed using Cox models and life-table analyses. The cause and timing of deaths between the groups was compared.

Results: A total of 905 patients were analyzed, of which 289 (32%) had COPD. EVAR was performed in 334 patients (37%), whereas fenestrated/branched devices were used in the remaining 571 (63%). Group 1 patients were younger (73.5 ± 6.7 vs 75.6 ± 8.2 years), had a better glomerular filtration rate (67.8 ± 25.8 vs 61.0 ± 23.3 mL/min/1.73 m^2), had higher hematocrits (41.6 ± 5.0 vs 40.5 ± 4.6), and had more extensive aneurysms. Mean follow-up was 39.5 ± 30.9 months. Early (3% vs 3%) and late (2% vs 1%) aneurysm-related deaths were similar between the two groups. Survival in group 1 was lower than that in group 2 ($P < .0001$; Fig 1). Furthermore, survival in group 1 was dependent upon the severity of disease, with Global Initiative for Chronic Obstructive Lung Disease classification I and II similar to group 2, and classifications III and IV demonstrating lower survival rates ($P < .0001$; Fig 2). Relevant pulmonary function test variables included a lower forced expiratory volume in 1 second and forced expiratory flow 25%-75%, which were associated with decreased survival. Surrogate endovascular outcome analyses demonstrated that group 1 patients had fewer endoleaks (20% vs 25%, $P = .05$) and more rapid sac shrinkage rate (1.66 mm/y difference, $P < .001$).

Conclusions: The perioperative risk of mortality between COPD and non-COPD patients is eliminated when endovascular techniques are used. Long-term survival in COPD patients is most strongly related to the severity of their disease, and forced expiratory volume in 1 second and forced expiratory flow 25%-75%, are reasonable indicators of poor long term outcomes. Morphologic changes following EVAR and eTAAA repair are more favorable in COPD patients, with a lower endoleak rate and faster sac shrinkage.

Are Lower Extremity Endovascular Procedures Associated with Fewer Hospital Readmissions?

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Objectives: As pressure to contain health care costs increases, there has been greater scrutiny of readmissions in the vascular surgery population. The objective of this study was to evaluate postoperative readmissions after open (OPEN) and endovascular (ENDO) lower extremity (LE) procedures for PAD (peripheral artery disease).

Methods: Inpatients with PAD and LE procedures were selected from the Cerner Health Facts database between October 2008 and December 2010, using International Classification of Diseases-9 Edition-Clinical Modification diagnosis codes (claudication, rest pain, and ulceration/gangrene) and procedure codes for LE revascularization (ENDO and OPEN). Readmission ≤30 days of discharge was determined. Charlson comorbidity index was used to adjust for comorbidities, and χ^2 and multivariable logistic regression were used to compare patients who received ENDO and OPEN procedures.

Results: Of 453,257 index admissions, 10,103 patients were identified with a diagnosis of PAD. Combining PAD with elective LE procedures during the index admission, 657 and 678 underwent OPEN and ENDO, respectively. Overall readmission rates or OPEN and ENDO for claudication, rest pain, and ulceration/gangrene were 9.68% vs 12.50% ($P = .29$), 14.29% vs 18.60% ($P = .38$), and 17.9% vs 20% ($P = .60$); respectively. Readmission increased by the severity of the diagnosis for both OPEN and ENDO ($P = .0001$). Men comprised 59% of the cohort, and readmission rates were not statistically different by sex ($P = .25$). Race was not associated with procedure performed ($P = .7$). After adjustment for age, race, sex, comorbidities, and procedure, patients with ulceration/gangrene (odds ratio [OR], 1.7; 95% confidence interval [CI], 1.17-2.41), non-Caucasian race (OR, 1.5; 95% CI, 1.08-2.19), and increased numbers of comorbidities (OR, 1.1; 95% CI, 1.01-1.22) were more likely to be readmitted. Diagnoses at readmission were similar between groups.

Conclusions: Less invasive endovascular procedures were not associated with decreased readmission rates compared with open surgery. Readmission rates for claudicants were unexpectedly high, with an overall rate of 11%. Predictors of readmission included black race and increased severity of disease. Further examination exploring reasons for readmission are required to decrease readmission rates in the vascular surgery population.

Midterm Results of Replacement of Synthetic Graft and Arterial Infection in the Groin With Femoropopliteal Vein

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Objectives: Infection of synthetic grafts or femoral arteries in the groin is a challenging problem to treat. Femoropopliteal vein (FPV) is an ideal conduit, but extensive replacement of infected aortic grafts with FPV has been associated with significant morbidity. The aim of this study was to evaluate early and long-term outcome of limited replacement with FPV of infected femoral arteries/grafts in the groin.

Methods: Data from 37 patients who underwent excision of infected femoral grafts and replacement with FPV over an 18-year period from 1994 to 2012 were retrospectively analyzed.

Results: Surgical intervention was performed in 41 limbs of 27 men and 10 women (mean age, 67.5 years) at a median of 2.5 years after the original synthetic implantation (aortofemoral n = 21, femorofemoral n = 3, femorodistal n = 5, patch angioplasty n = 2) or, on average, 22.2 days after cardiac catheterization (n = 6) and one mycotic aneurysm. Presentation included draining sinus (n = 7), abscess (n = 4), persistent fevers (n = 6), and pseudoaneurysm (n = 10; intact, 4; ruptured, 6). Twenty-five patients